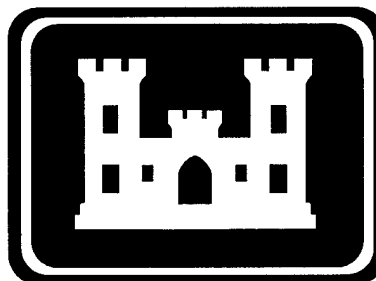


**Phase II Archaeological and  
Geomorphological Investigation  
Water Treatment Plant Upgrade  
Fort Leavenworth, Kansas**

**Contract Number  
DACA41-00-D-0004**

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27139**

**Principal Investigators  
Mark A. Latham/ Eric Petersen**

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**Prepared for  
U.S. Army Corps of Engineers, Kansas City District**

**By  
Burns & McDonnell  
Engineers-Architects-Consultants  
Kansas City, Missouri**

*AQ 403-01-0011*

(1) The study performed herein by the Contractor for the U.S. Army Corps of Engineers is authorized in the National Historic Preservation Act of 1966, as amended.

Accomplishment of this work provides documentation evidencing compliance with Executive Order 11593 "Protection and Enhancement of the Cultural environment" dated 13 May 1971, and Section 110 of the National Historic Preservation Act.

(2) The U.S. Army Corps of Engineers provided funds for this investigation and report. The corps may not necessarily agree with the contents of this report in its entirety. The report reflects the professional views of the Contractor who is responsible for collection of the data, analysis, conclusions, and recommendations.

## ABSTRACT

This report describes the results of a Phase II Archaeological and geomorphological investigation conducted by Burns & McDonnell archaeologists and private consulting geomorphologist, Rolfe D. Mandel, Ph.D. The purpose of this investigation was to locate, record, and give a preliminary assessment of the National Register of Historic Places (NRHP) eligibility of all cultural properties identified within the proposed project area within the military facility at Fort Leavenworth, Kansas. The investigation involved archival, literature and records research of documents held at the Frontier Army Museum and State Historic Preservation Office (SHPO) at Topeka. During the investigation the records of all previously recorded sites, NRHP properties, and previous archaeological investigations within the fort were researched. Historic maps, photographs and engineering plans were studied to identify all historic structures within the project area.

Archaeological fieldwork was limited to geomorphic studies using backhoe trenches within the project area. The goal of these studies was to remove the fill imported to the project area and examine the subsurface for intact cultural deposits, including both prehistoric and historic components. Attempts were made to examine the areas likely to contain historic features as revealed by archival research.

Three "T" test trenches were excavated within the Area of Potential Effect. These trenches verified the presence of imported fill. On top of sterile loess fill up to 40 to 170 cm of modern fill, what is believed to be fire and other construction-related debris, had been deposited. No intact buried cultural material was found. The geomorphological investigations revealed that the likelihood of intact cultural deposits below the fill was virtually non-existent due to the presence of bedrock and a high water table.

It is the opinion of the investigators that no historic properties are located within the area of the proposed undertaking and none will be affected.

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## **1.0 INTRODUCTION**

## **1.0 INTRODUCTION**

This report describes the results of the archival research and geomorphological field investigations conducted by Burns & McDonnell and its subcontractors. The purpose of these investigations was to verify the presence and nature of fill in the Area of Potential Effect (APE) of a proposed wastewater treatment plant.

The area under investigation is located at the eastern edge of the Fort Leavenworth Military Reservation, in Leavenworth County, Kansas, overlooking the Missouri River (Figure 1-1). The work is being carried out under the auspices of the Kansas City District of the U.S. Army Corps of Engineers in compliance with Section 106 of the National Historic Preservation Act 1966 (as amended).

### **1.1 PURPOSE**

Fort Leavenworth Military reservation is proposing to upgrade their current water treatment facilities. The expansion will include construction of two primary structures, a residual dewatering building and gravity thickener. The gravity thickener is projected to extend to a depth of approximately 22 feet below the current surface. There will also be associated construction disturbance across the site.

### **1.2 DESCRIPTION OF THE STUDY AREA**

The area selected is located on an unplatted area of federal land located within the boundaries of the fort (Figure 1-2). The study area examined for the proposed undertaking is at its greatest extent approximately 145 meters east/west by 420 meters north/south (Figure 1-3). The area is situated on an artificially created flat bench approximately 10 meters above the valley floor of the Missouri River. The area is immediately south of the surviving portion of the Levee Warehouse. However, the project area is currently undeveloped and contains no standing structures. It is crossed on the eastern one third by utility poles, buried fiber optic cable, the Missouri Pacific railroad line and a buried cable, most probably a power cable, and there is a variety of mowed grasses across the surface.

At various times since the establishment of the fort, the project area has undergone episodes of significant mechanical modification. Based on the findings conducted for this study, the slope of the valley was mechanically leveled in the past. It is possible that this may have been done to gain more ready access to the ferry crossing for shipping related activities in an area of warehouses.

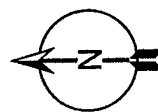
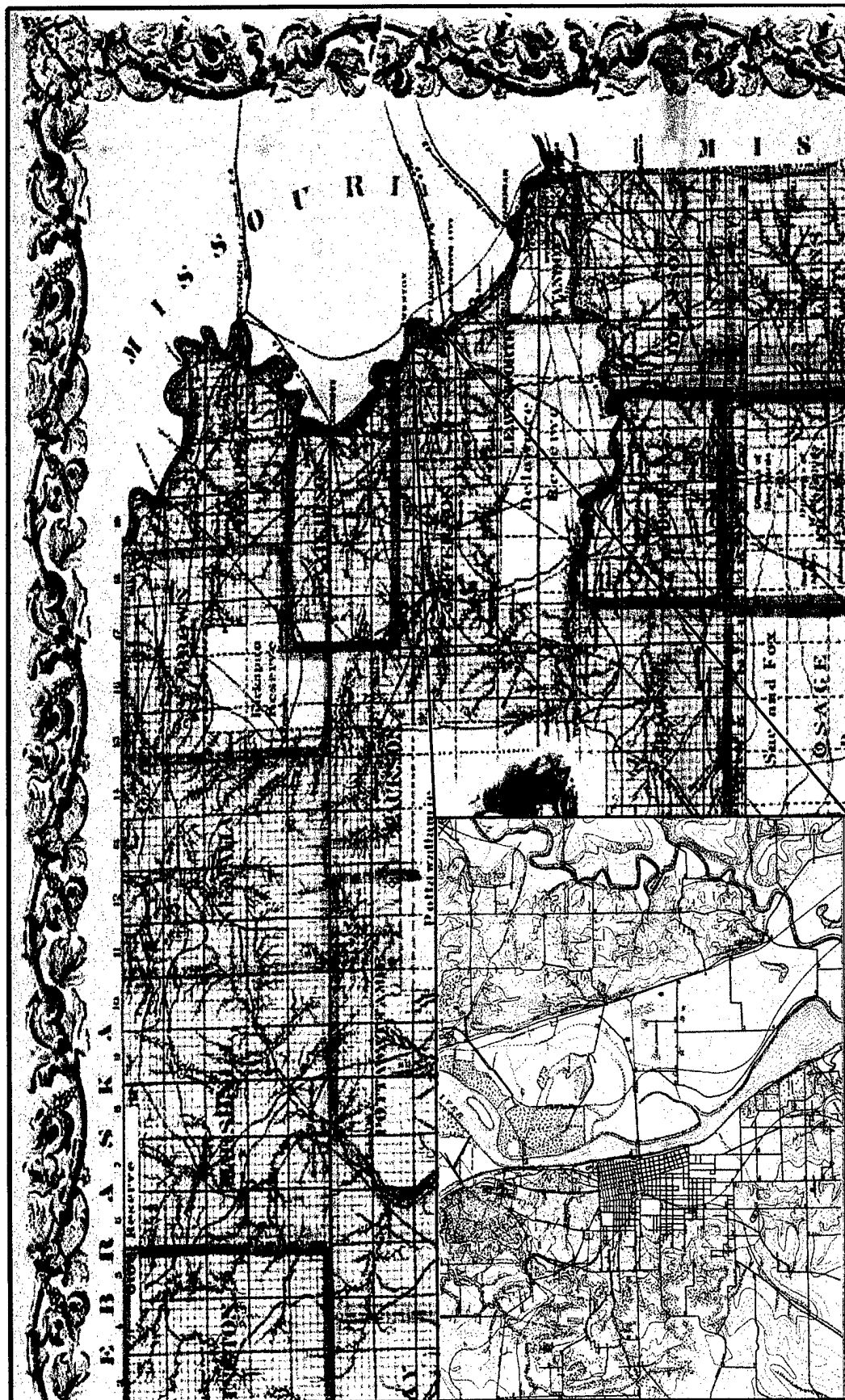
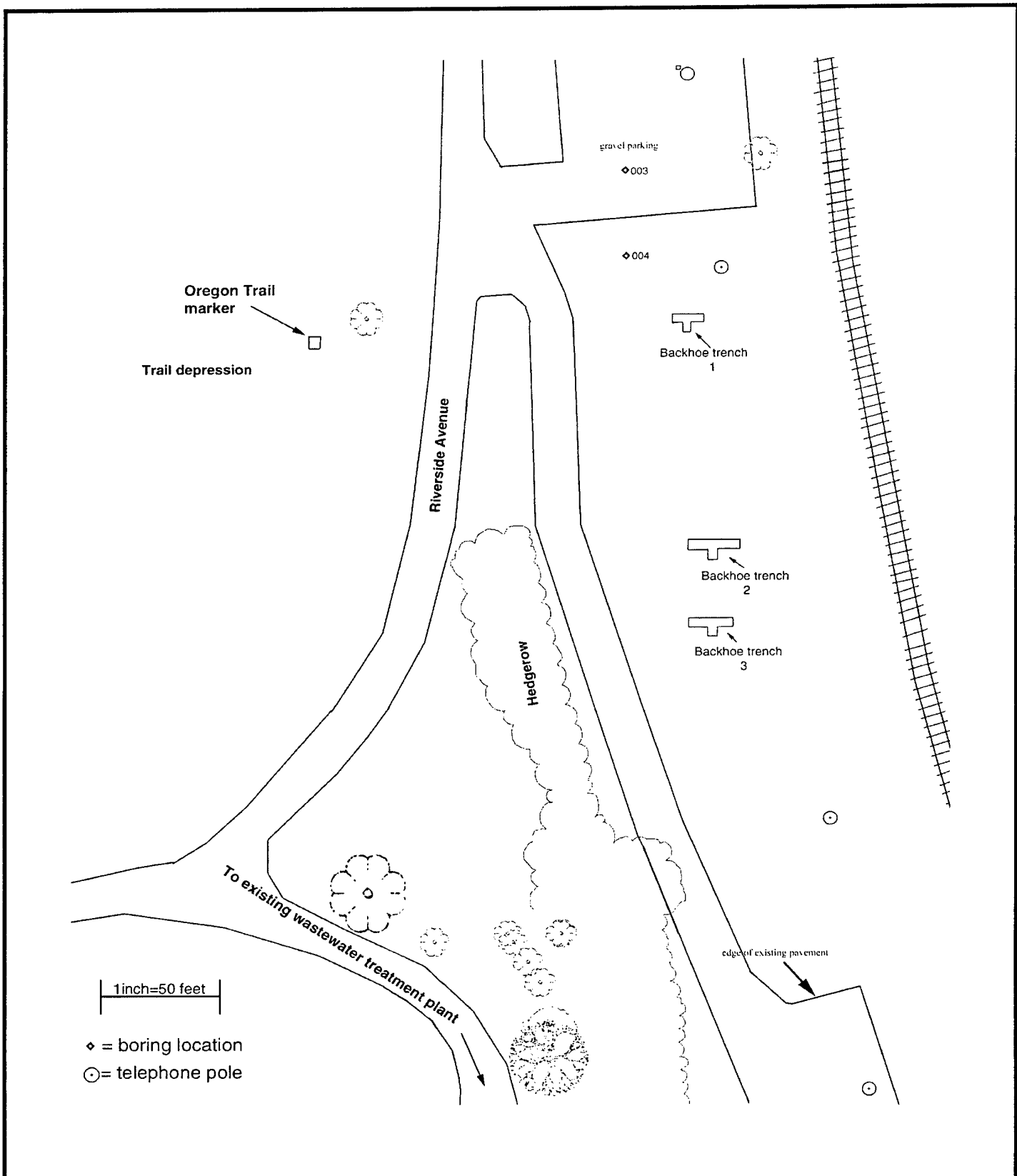


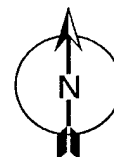
Figure 1-1  
Fort Leavenworth Area  
Adapted from Gunn(1859) and Howry(1900)

Burns &  
McDonnell  
SINCE 1898





**Figure 1-3**  
**Project area**



### **1.3. CONSTRUCTION**

Construction of the proposed project is expected to include using heavy earthmoving equipment. Blasting in some areas may be necessary as part of the cut activities. Construction would be accomplished using earthmoving and grading equipment, including bulldozers, scrapers, and dump trucks. Existing vegetation would be removed and the ground scraped bare. Gravel or other required materials would be acquired from local sources to minimize haul distances.

### **1.4 OBJECTIVES OF INVESTIGATION**

The primary objectives of the present investigation were to conduct a thorough field examination of the project area, including coring and trenching of selected localities to determine the geologic potential for buried historic and prehistoric cultural resources based on the presence or absence of Holocene and late Wisconsinan sediments and buried soils. In addition, the sediments and soils were inspected in order to identify buried cultural resources within the project area and provide an assessment of their eligibility for inclusion in the National Register of Historic Places (NRHP).

These objectives were achieved through an intensive archival, literature, and records research of documents held at the Frontier Army Museum and the files maintained at the Kansas State Historic Preservation Office (SHPO) in Topeka. All work was conducted to professional standards and guidelines in accordance with the Secretary of the Interiors *Standards and Guidelines for Archaeology and Historic Preservation*, 48 FR 44716-44742 and in accordance with the Secretary's Standard for Identification (48 FR 44720-44723).

### **1.5 PERSONNEL**

The field investigation was performed during April 2001 by staff from Burns and McDonnell Inc. Mark A. Latham served as principal investigator, project director, and report author. Eric Petersen directed the fieldwork and co-author of the report. Rolfe Mandel, Ph.D. served as the geomorphologist for the project and wrote the sections presenting the results of the geomorphological investigations. Adrienne Vaughn conducted portions of the archival investigations.

### **1.6 REPORT FORMAT**

Chapter 2 provides a regional and local environmental overview that establishes the environmental context for the project. Chapter 3 establishes the cultural context by providing an overview of the regional prehistory and local history of the project area. Chapter 4 includes a brief overview of the

previous cultural resource investigations conducted in or adjacent to the project area. Chapter 5 provides the research design and methods guiding the current investigations and presents the research objectives. Findings of the archival research are presented in Chapter 6. Chapter 7 is authored by Rolfe Mandel and includes the results of the geomorphological field investigations and the implications these findings have on the potential presence of archaeological deposits. The conclusions, recommendations and preliminary evaluations are presented in Chapter 8.

## **2.0 ENVIRONMENTAL OVERVIEW**

## 2.0 ENVIRONMENTAL OVERVIEW

The project area is situated within the Kansas Drift, the only portion of Kansas covered by glaciers during the Pleistocene. The Glaciated Region is a dissected drift plain in the northeastern corner of Kansas (Figure 2-1). During the Kansas glacial episode, a continental ice sheet that extended, in places, south beyond the Kansas River, covered this area. The advance of the ice sheet into northeastern Kansas scoured stream valleys and leveled uplands throughout the drift plain. This plain is underlain by Pennsylvanian and Permian bedrock formations similar to those of the Osage Cuestas, but thick deposits of till, outwash, and loess conceal the cuesta type topography that prevails south of the Kansas River.

Underlying the region are alternating layers of limestone and shale of the upper Pennsylvanian and lower Permian systems. The differential erosion of these alternating hard and soft rock layers form cuestas. The more resistant limestone strata form the upland scarp and dip slopes of each cuesta, while the thicker and softer shales erode more readily to form the intervening lowlands. The dipping strata form a series of parallel ridges with gently sloping west faces and steeply sloping east faces (Mandel 1987). Oread limestone caps the escarpments in the vicinity of the project area, forming the Oread Escarpment. This limestone is relatively weather resistant compared to some of the softer rock formations in the area.

Just to the east of the project area is the Missouri River, which forms the eastern boundary of the Fort Leavenworth military reservation (Figure 1-2). This mature stream flows through a valley 4.5 km wide with bluffs ranging in height from 30 to 90 meters. The channel itself varies in width between 250 and 350 meters through this area. The tributary streams found in the eastern portion of the military reserve include Corral, Quarry and One Mile Creek. these streams generally flow through well-defined channels with steep sloping banks (Wagner *et al.* 1993).

The majority of the rocks on the surface in Kansas are sedimentary in origin, consisting chiefly of shale, sandstone, and limestone. In eastern Kansas, the most common surface rocks were formed during the Pennsylvanian period. These rocks are primarily marine and nonmarine shales, limestones, and sandstone (Mandel 1987). The soils which are present in the upland areas include: Grundy, Ladoga, Martin, Oska, Polo, Sogn, and Vinland. All of these soils are deep to moderately deep except Sogn and Vinland, which are both shallow soils. The deep soils range from well drained to somewhat poorly drained. These soils have formed in residuum from limestone or shale, in residuum from interbedded silty and clayey shales,

# Generalized Geologic Map of Kansas

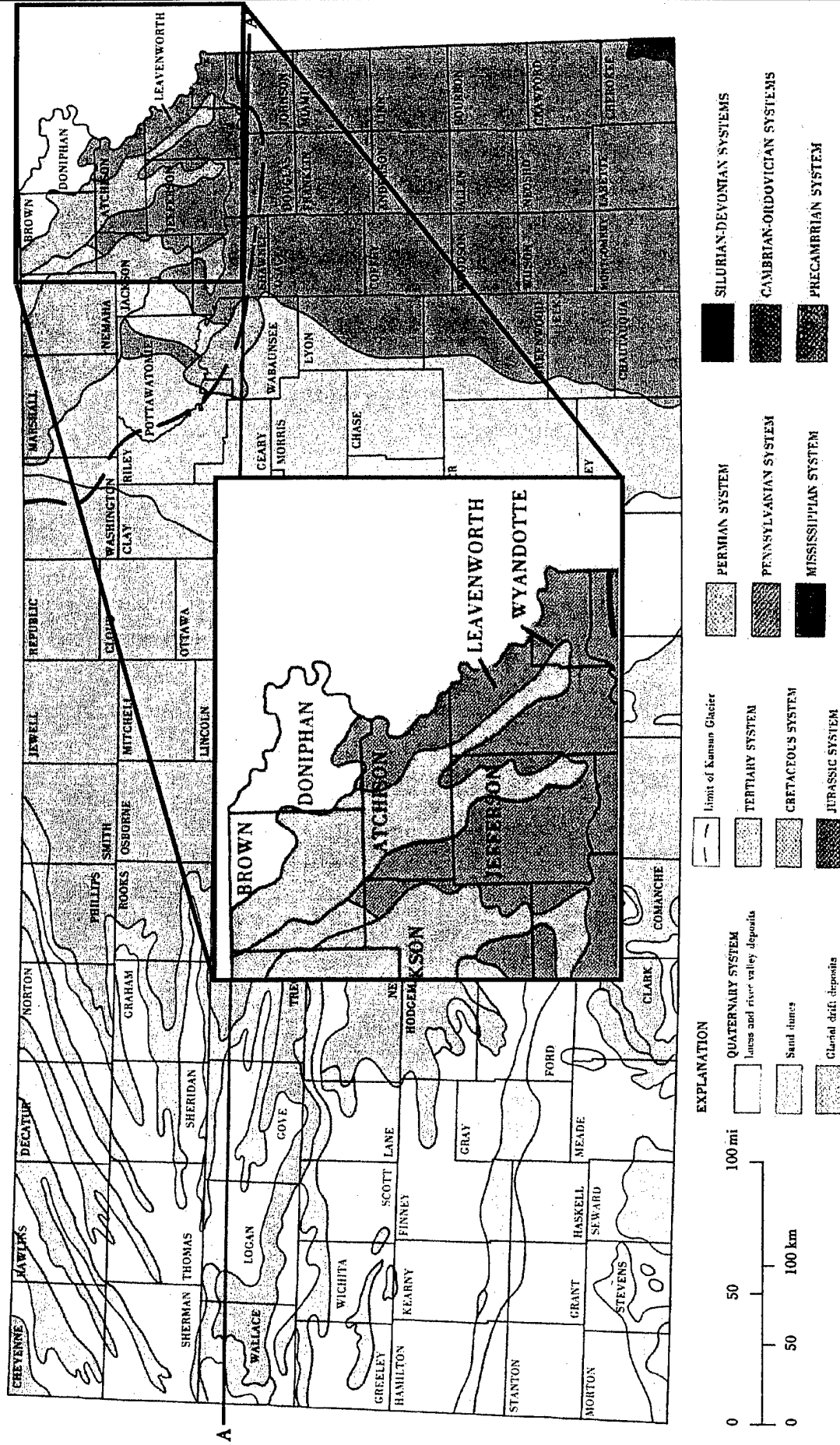
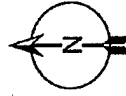


Figure 2-1

Adapted From the Generalized Geologic Map of Kansas



The shallow soils are both somewhat excessively drained and moderately permeable soils. These soils formed in residuum from the underlying limestone.

Based on the aerial maps in the Leavenworth and Wyandotte Counties soil survey, the predominate soil in the project area is Knox complex, 18 to 30 percent slopes. Knox complex is a mixture of 40 percent Knox silty clay loam, 25 percent similar silt loam soil, and 35 percent Sogn soil with limestone outcroppings. The east edge of the project area may intersect the Eudora complex, overwash, consisting of 70 percent Eudora soil, a level, well-drained silty alluvium, and 20 percent Haynie soil, a deep, level, well-drained calcareous soils (Zavesky and Boatright 1977).

The climate within the project area is a typical continental type characterized by wide daily and annual variations in temperature. Winter conditions prevail from December to February with an average high temperature of 32.3 degrees F and the average daily minimum is 22.5 degrees F. The summer season lasts for around six months every year and the transition season of spring and fall are relatively short. The summer average high temperature is 76.0 degrees F and the average annual precipitation is 38.52 inches.

Kansas is located in the extensive North American grassland region variously referred to as the Great Plains, Prairie, and Plains, or Interior Grasslands. This region extends from Canada in the north to Texas in the south. The western limit of the Interior Grasslands is distinctly bounded by the Rocky Mountains and the eastern limit is bounded by the Eastern deciduous forest. Most of extreme eastern Kansas is a mosaic of forest and prairie. In a mosaic, the species of one vegetative community are not mixed with those of the other. Instead, each community retains its discrete character. The oak-hickory forest of northeastern Kansas does not gradually open up into savanna, each occupies its own landscape (Mandel 1987). Thus, the vegetation near the project area is a combination with islands of prairie and forest.

The oak-hickory forest in the glaciated region of Kansas marks the western boundary of the eastern deciduous forest. The trees in this forested area form a dense crown cover, allowing little sunlight to reach the ground in summer. The vegetation is dominated by white oak (*Quercus alba*), red oak (*Q. borealis*), Black oak (*Q. velutina*), bitternut hickory (*Carya cordiformis*), and shagbark hickory (*C. ovata*). Other common components are chinquapin oak (*Q. muhlenbergii*), blackjack oak (*Q. marilandica*), black locust (*Robinia pseudoacacia*), basswood (*Tilia americana*), elm (*Ulmus* sp.), and sugar maple (*Acer saccharum*) (Mandel 1987).

### **3.0 CULTURAL OVERVIEW**

### 3.0 CULTURAL OVERVIEW

Archaeologists generally divide the prehistoric cultural sequence of the Great Plains into two pre-ceramic and three ceramic stages. The earliest pre-ceramic stage has been variously designated the Paleoindian, Paleo-American, or Lithic stage and is dated from more than 10,000 BC to about 4500 BC. Following the first pre-ceramic stage is the Archaic stage, which dates from 4500 BC to AD 1. The first ceramic stage is known as the Early Ceramic, Plains Woodland, or Formative stage and dates from AD 1 to AD 1000. The next ceramic stage is termed the Middle Ceramic, Plains Village, or Classic stage and dates from AD 1000 to AD 1450. The final prehistoric stage in the Great Plains is known as the Late Ceramic, Protohistoric, or Post-Classic stage and dates from AD 1450 to AD 1650.

Following the prehistoric stages in the Great Plains is the Historic period, which generally dates from A.D. 1800 to the present. Considerable overlap occurs between the Historic period and the last prehistoric stage because of the introduction of European cultural influence and technology from approximately A.D. 1540 to 1800. This time also marks the beginning of written accounts of events. The stages of cultural development in the Plains are defined by changes in technology, settlement, and subsistence. None of the cultural stages are considered confined to their particular range of dates and can fluctuate across regions within the Great Plains.

#### 3.1 PALEOINDIAN

The Paleoindian stage is best defined by the presence of extinct megafaunal remains in ecofact assemblages of archaeological sites found in North America. This stage is generally thought of as a period dominated by highly mobile hunting and gathering bands living a nomadic lifestyle and exploiting, by choice, a limited number of resources.

In the Great Plains, Columbian mammoth (*Mammuthus columbi*), long-horned bison (*Bison antiquus*), camel (*Camelops hesterus*), and horse (*Equus* spp.) were the most commonly hunted megafauna, but a wide range of other game species such as white-tailed and mule deer (*Odocoileus* spp.), wapiti (*Cervus canadensis*), pronghorn (*Antilocapra americana*), canids (*Canis* spp.), rabbit, and rodents were also exploited. Certainly some vegetal foods were collected but archaeological evidence of this activity is scant. Other archaeological excavations across North America such as Drynoch Slide and Glenrose in British Columbia, Shawnee Minisink in Pennsylvania, and Plenge in New Jersey, suggest that fishing supplemented the diets of many groups.

### 3.1.1 Llano Complex

The first generally accepted widespread cultural adaptation to be observed in North America is the Llano or Clovis complex which is believed to date from 11,500 B.P. to 11,000 B.P. However, there are recent discoveries that suggest Pre-Clovis occupations occurred in the Americas perhaps as early as 30,000 years B.P. Archaeological sites attributed to the Pre-Clovis horizon that show promise of containing Pre-Clovis evidence include Monte Verde, Chile (Dillehay 1984:100-109; Quivira and Dillehay 1988:177-191); Meadowcroft Rockshelter, Pennsylvania (Adovasio et al. 1983:163-189); Pendejo Cave, New Mexico (Chrisman et al. 1996:357-376); Selby/Dutton and Lamb Springs, Colorado (Stanford 1979; Stanford et al. 1981); the Big Eddy Site, Missouri (Ray 1997); and Shriver, Missouri (Reagan et al. 1978). These sites are, in most cases, controversial and have yet to be fully accepted by the professional community as evidence for a Pre-Clovis occupation.

Clovis is the earliest complex found in the region. Sites associated with this complex are predominantly kill sites. Kill sites with mammoth skeletal remains predominate and the primary diagnostic tools are large, fluted dart points. The function of these sites is that of the initial kill, butchering, and associated campsites. Most of these sites have been found along the edge of shallow lakes where large animals could become mired in the mud and easily killed by opportunistic hunters. The type-site of the Clovis Complex is near the present community of Clovis, New Mexico. The most diagnostic artifact is the characteristic fluted projectile point, but sites may include end scrapers, commonly spurred; large unifacial side scrapers; keeled scrapers on large blades; flake knives; some backed (dulled on one edge), worked blades, graters, and perforators; bone points; foreshafts; and shaft straighteners (Haynes 1970).

### 3.1.2 Folsom Complex

The Folsom Complex follows the Clovis Complex. The subsistence of these people was still primarily centered around large extinct mammals, but the focus changed from mammoth to bison (*Bison antiquus*). These people were also nomadic, roaming the high plains from about 8,500 to 7,000 B.C. The type-site for the Folsom Complex is near Folsom, New Mexico. The excavations of this buried kill site recovered 19 fluted projectile points in association with skeletons of extinct *Bison antiquus* (Wormington 1957:23-29). The diagnostic artifacts associated with this complex include the Folsom point. This projectile point is similar in fluting technique to the Clovis point. The manufacturing technique creating the fluted projectile point often produces a fragmented channel flake and consequently, a second diagnostic character is this channel flake. Many other stone artifacts are found in Folsom Complex sites as represented at Lindenmeier, the Lipscomb Bison quarry, Cooper Bonebed, and the Nall Site.

The Llano Complex was originally applied to a complex of artifacts found in direct association with extinct megafauna, especially mammoth. Its origins are unknown. The most diagnostic artifact of the complex is the distinctive Clovis fluted projectile point, which is the earliest known projectile point in North America. Additional artifacts associated with the Llano complex include scrapers, graters, bifaces, cylindrical bone and ivory foreshafts, and/or projectile points and hammerstones (Lahren and Bonnicksen 1974; Frison and Zeimens 1980:234). No sites from the Llano complex have been excavated in the state of Kansas, but surface finds of the distinctive Clovis projectile points have been reported. Most of the information known about the Llano complex comes from excavations from the surrounding states.

Folsom points developed directly from the preceding Clovis point form. The distribution of Folsom points is generally confined to the High Plains region, however they have been found as far east as northeastern Kansas. The only Folsom complex site excavated in Kansas is the 12 Mile Creek site, first investigated in 1895. The validity of the projectile point identification of the 12 Mile Creek artifact assemblage is somewhat controversial. Some believe that the points are Folsom while others believe they are Clovis (Wedel 1959; Rogers and Martin 1984). Unfortunately, the artifacts from this excavation have since been lost. In either case, the antiquity of the site cannot be questioned.

### **3.1.3 Plano Complexes**

With the termination of the Folsom complex, an explosion of lanceolate projectile point styles occurred across the Great Plains. These new point types were generally well made lanceolate or shouldered forms with parallel-oblique flaking patterns and heavily ground bases. The types include: Alberta, Cody, Browns Valley, Angostura, Lusk, Fredrick, Pryor Stemmed, Plainview, Hell Gap, Meserve/Dalton, Milnesand, Midland, Agate Basin, Scottsbluff, and Eden. The majority of what we know about these sites comes from investigation of mass bison kill sites. It is during the Plano that subsistence shifts from extinct fauna (*Bison antiquus*, *Equus* sp., *Camelops* sp.) to modern, extant fauna (*Bison bison*, *Odocoileus virginianus*, *Ursus americanus*). The earliest Plano complexes are frequently associated with extinct forms of bison, but by 7,000 BC modern fauna occurs with all Plano complexes

## **3.2 ARCHAIC PERIOD**

The Archaic period is normally subdivided into Early, Middle, and Late stages. Archaeologically, little is known of the Early and Middle Archaic phase in Kansas. Our knowledge of the Middle Archaic in this region is increasing due to recent excavation on (14LV1071) the Disciplinary Barrack site in Leavenworth County, Kansas. The physical evidence from the site makes it appear that the subsistence economy of the Middle Archaic in eastern Kansas was similar to that of the Middle Archaic in southern

Illinois and near present day St. Louis. This physical evidence includes full grooved stone axes, half-moon shaped hafted scrapers, side notched projectile points, manos, metates, and in one case a decorated ground stone artifact with incised "X", incised parallel lines, and incised crosshatching. The Late Archaic in eastern Kansas has two defined cultures: (1) Nebo Hill phase and (2) Colvin phase (Logan 1996).

### **3.2.1 Nebo Hill Phase**

The Nebo Hill phase is primarily located in the lower Missouri River valley, especially between St. Joseph and Kansas City, Missouri. The eastern boundary can be set at the Bethany Falls and Burlington escarpments, while the western boundary follows the Oread escarpment and the Flint Hills. The southern border coincides with the upper reaches of the Osage River and the northern border extends into southwestern Iowa. Characteristic artifacts include the lanceolate Nebo Hill projectile point and large bifaces consisting of hoes, gouges, and rectangular celts. Ground and pecked stone tools include rectangular and ovate manos and grooved axes. The earliest recognized pottery in Kansas is associated with the Nebo Hill phase. The pottery is a fiber-tempered ware.

The economy of the Nebo Hill phase consisted of hunting, and harvesting the deciduous forest and forest edge resources. They may also have cultivated gardens containing tropical cultigens, such as squash and bottle gourd (Logan 1996). The origin of the phase may have been associated with the drier climate of the post-Hypsithermal. The disappearance of the phase may have occurred with the development of larger, sedentary villages based upon stored surpluses (Reid 1984).

### **3.2.2 Colvin Phase**

The Colvin phase appears to be limited geographically to the Wolf and Long Creek drainages in Coffey County, Kansas. Little is known about this phase and it is not known to be within the current project boundary. Therefore, no additional information concerning the specifics of this phase is included in this report.

## **3.3 CERAMIC PERIOD**

The Ceramic period, like the Archaic, is divided into Early, Middle, and Late stages. This follows what in the Eastern United States is called the Woodland period. The most diagnostic achievement during this period was the creation of pottery. The appearance of burial mounds, evidence of the use of domesticated plants, of long-distance trade, and of more complex social systems also occurs. Some or all of these traits appear in Kansas at this time (O'Brien 1984; Logan and Beck 1995).

In the East, the Woodland period is divided into Early (1000-500 BC), Middle (500 BC-AD 500), and Late (AD 500-900). No evidence of the Early Woodland has been found in Kansas. Kansas City Hopewell, which in Kansas is equivalent to Middle Woodland, dates from AD 1-500. Late Woodland sites are found in Kansas, especially in the eastern part of the state, but more common are sites which are labeled Plains Woodland and cover all or part of the AD 1-900 year date range (O'Brien 1984).

### **3.3.1 Early Ceramic Period**

Currently eight archaeological complexes have been identified in Kansas, only four of which are relevant to this project location: Kansas City Hopewell complex, Valley focus, Grasshopper Falls phase, and an unnamed complex. Each of these is located within a specific geographic area. Kansas City Hopewell is located in the Lower Missouri River Valley. The Valley Focus is centered in southeastern Nebraska but is occasionally found in northeastern Kansas along with the Grasshopper Falls phase. Finally, the unnamed complex dates to the Late Woodland period and is located in the Kansas City area.

### **3.3.2 Middle Ceramic Period**

During the Middle Ceramic period, people became more reliant on horticulture, although hunting and gathering continued to be important subsistence activities. There is also evidence that groups became more sedentary. Plains Village or Mississippian remains have also been found in the lower portion of the Kansas River region. Included are remains of the Steed-Kisker phase, a semi-sedentary horticultural complex exhibiting Mississippian influences. Also found in the eastern Kansas River region are the remains of the Pomona variant. This cultural complex extends throughout much of the eastern third of Kansas and part of western Missouri, where it is also referred to as May Brook (Brown 1985). The Pomona variant, while contemporaneous with the Smoky Hill, Nebraska, and Steed-Kisker phases, appears to be a continuing Late Woodland adaptation influenced by neighboring Plains Village cultures (Witty 1967, 1978:59-62, 1981; Blakeslee and Rohn 1986:1292; Brown 1985).

### **3.3.3 Late Ceramic Period**

The Late Ceramic period, also called the protohistoric period, is defined as that interval of time during which Europeans were in North America, but had little or no direct contact with the native populations in the interior. Their presence did have a direct impact on the native populations through diseases they carried and the technology they possessed. For the Kansas River basin the period extends from the end of the Plains Village period (AD 1400) until the era of Euroamerican exploration in the early 1700s. The influence of the Europeans and the Euroamericans is poorly documented in the area until the eighteenth

century. Few, if any, archaeological remains from this period have been located in the Kansas River valley.

The first Europeans to enter eastern Kansas probably arrived in the late seventeenth or early eighteenth century via the Missouri and Kansas Rivers. Their first contact was probably with the Kansa, who were likely related to the prehistoric and protohistoric Oneota of the Midwest who had moved into the area during protohistoric times (Unrau 1971). In 1800, the Kansa moved from the mouth of the Kansas River upstream to an area around present-day Manhattan, Kansas. No other native groups are documented along the Kansas River during the early Historic period.

### **3.4 HISTORIC PERIOD**

In 1804, Lewis and Clark made their way westward through the area along the Missouri River. On July 4, 1804, their journal describes the area near present-day Atchison. The same day they discovered an unnamed creek and named it Fourth of July Creek (Bakeless 1962). This name later got changed to Independence Creek. On their way home, they passed by the area again and stopped at one of the trading posts owned by a member of the Chouteau family.

In 1819, a treaty negotiated between Spain and the United States defined the western limits of the United States; however, it took a revolution in Texas in 1845 to obtain all of the lands we know as Kansas. The Kansa subagency was established downstream from the Kansa villages in AD 1827 south of present-day Williamstown. The first operator of the subagency was Daniel Morgan Boone. The Methodist Episcopal mission was sporadically associated with the Kansa sub-agency between AD 1830 and 1846. Nearby, Frederick Chouteau operated a trading post near the village of Chief White Plume. The Chouteau's did not have a monopoly on the trading activities, but their friendship with the Kansa insured them of considerable control over trade throughout the area. Another small trading post in the area was started in 1852 by Josesh Utt in what is today the town of Doniphan. The town was formally organized in 1854 at the beginning of the civil war, but declined shortly thereafter. Other Euroamerican traders who operated in the area are little known, but it is possible that archaeological evidence of their activities still exists.

One of the areas where archaeological evidence of early traders may exist is along the Santa Fe trail. The trail linked various routes that were first followed by American Indians, then by Spanish, Mexican, and American frontiersmen. Eventually they developed into major trans-Mississippi route between the eastern United States and the American west. The trail played critical roles in the westward expansion of the United States.

Fort Leavenworth was to be established on the left bank of the Missouri River, near the mouth of the Platte River, in 1827 by order of the U.S. War Department. Upon investigation of this area Colonel Henry Leavenworth determined that there was no good setting for the fort on the left bank and placed it in its current location, as this area was near the Santa Fe Trail and in a setting more easily defended. The War Department accepted it and Cantonment Leavenworth was officially recognized. The fort has been an active military facility throughout the time since it was established, functioning at variety of levels. As a result, numerous building episodes have been documented, but the main concentration of building and use has been west of the project area.

Much of the land in eastern Kansas became reservations for numerous Native Americans displaced from their homelands east of the Mississippi River. The Delaware reserve bordered Fort Leavenworth and extended to the north shore of the lower Kansas River (Richmond 1974; Unrau 1971).

The steamboats brought many things up the river, but none had as much impact on the native population as the diseases transported on these ships. In 1833, the Yellowstone brought cholera up the Missouri River and into Kansas. Another outbreak of cholera occurred in 1849, as numerous steamboats brought infected persons and corpses up the river into Dakota Territory (Chittendon 1903). The *Saint Peter's*, a steamboat owned by the American Fur Company, introduced smallpox into Dakota Territory in 1837. Steamboat shipments appear to have introduced numerous other diseases to the Native population (Rogers 1990).

The Kansas Territory was established in 1854 under the regulation of popular sovereignty to determine whether or not slavery would be allowed. The City of Leavenworth was the first town established in the Kansas Territory after the passage of the Kansas-Nebraska Act of 1854. The town was staked out on 320 acres along the south boundary of Fort Leavenworth, even though this was Delaware Trust Land (Blackmar 1912; Barry 1972). The town was named after Fort Leavenworth, primarily since it was associated with being on a desirable portion of the Missouri River and this would draw settlers (Moore 1906).

## **4.0 RESEARCH DESIGN AND METHODS**

## **4.0 RESEARCH DESIGN AND METHODS**

This area was proposed for testing in keeping with the agreements made between the U.S. Army Corps of Engineers and the SHPO concerning the proposed project and its impacts to cultural resources. No archaeological survey of the project area was conducted due to the approximately six feet of landfill covering the project area. The U.S. Army Corps of Engineers previously determined that the use of geomorphic testing, utilizing both drilling and backhoe trenching, would be the most productive method for identifying cultural resources in the project area.

### **4.1 OBJECTIVES**

The primary objective of the current geomorphological testing program was to determine the potential for intact cultural resources and to evaluate any archaeological sites in the proposed area of potential effect with respect to the National Register of Historic Places (NRHP) eligibility criteria (36 CFR 60.4).

The study of the interaction between geomorphic processes and both the presence of an archeological site and its data potential is an important archaeological research question, and can be an important component of NRHP eligibility. In locations that have experienced geomorphic processes for long durations, as well as intensive human impact, it is likely that the landscape will be complex and disturbed. Geomorphological analysis of the project area was conducted to determine the processes which may have affected the presence and condition of any archeological sites.

The NRHP criteria are listed below:

The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and

- a) that are associated with the events that have made a significant contribution to the broad patterns of our history; or
- b) that are associated with the lives of persons significant in our past; or
- c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- d) that yielded, or may be likely to yield, information on prehistory or history.

#### Criteria considerations.

Ordinarily cemeteries, birthplaces, or graves of historical figures; properties owned by religious institutions or used for religious purposes; structures that have been moved from their original locations, commemorative in nature; and properties that have achieved their significance within the past 50 years shall not be considered eligible for the National Register of Historic Places (36 CFR 60.4)

Typically the most applicable criteria for evaluating archaeological properties is Criterion (d). In general, prehistoric and historic sites containing subsurface deposits in the form of features or middens that are potentially eligible to be considered for listing on the National Register of Historic Places (NRHP) fall within Criterion (d). Sites that are viewed as likely to contain intact subsurface deposits are determined by occupation intensity, function or type of site, and the degree of disturbance. Site integrity and condition are key factors in evaluating NRHP eligibility.

## **4.2 RESEARCH QUESTIONS**

The level of research questions that can be addressed and the types of archaeological data that can be recovered during testing projects are more limiting than that obtained from data recovery projects, but generally more comprehensive than surface surveys. Data obtained from site testing may provide information on the lifeways of the people in a region that can be used to study a wide range of cultural manifestations. The research objectives of the present investigation were organized around the extent of the cultural deposits, their integrity, and the historical importance relative to the regional framework.

Data obtained from the project area during excavation was used to address the following general topics:

1. Determination of the presence of subsurface deposits and the horizontal and vertical extent of those deposits.
2. Assessment of site integrity and the severity of impacts to the deposits.
3. Definition of site function and assessment of site type.

## **4.3 RESEARCH METHODS**

The methods of research used during the current project were diverse, yet were interrelated multidisciplinary approaches to determine the presence and NRHP significance of any cultural resources within the project area.

#### **4.3.1 Records Search and Literature Review**

Prior to the beginning of the field investigations, a review of archaeological and historical literature relevant to the study area was conducted. The pre-field review included examination of the site inventory records on file at the Kansas SHPO records and archival data available at the Frontier Army Museum, Fort Leavenworth. As a result of this process, numerous archaeological studies and previously recorded sites were identified in the vicinity of the project area. The review also provided information for the cultural history and environmental overview of the area, as would pertain to the site distribution and evaluation of cultural resources. In addition, the pre-field investigation provided a summary of the previous investigations conducted in the area. In conjunction with the NRHP significance criteria, the information provided a context by which all cultural resources can be evaluated. The preliminary evaluation also includes the potential significance of each site and its potential for listing on the NRHP.

#### **4.3.2 Curation**

No artifacts or other archeological materials were collected during the investigation. All field notes, photographs and other appropriate records will be temporarily curated at the facilities of Burns & McDonnell, Inc. in Kansas City, Missouri, allowing for accessibility during preparation of the technical report. After acceptance of the final report, the materials will be curated at the Frontier Army Museum, Fort Leavenworth. No artifact curation will be required.

## **5.0 PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS**

## 5.0 PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

An intensive records search of the files maintained at the Kansas SHPO office in Topeka, Kansas and a review of the associated reports resulted in the identification of several previous archaeological and historic architectural surveys have been conducted within and adjacent to Fort Leavenworth.

Archaeological investigations can be traced to 1830 within the area, as Isaac McKoy, Baptist Missionary, reported the first discovery of burial mounds in Kansas. He reported "eight mounds or heaps of stones" on a hill near the garrison (Barnes 1936:30; from Wagner *et al.* 1989:13). In 1845, eight mounds were reported in the same area (Carleton 1943:63; from Wagner *et al.* 1989:14). A re-investigation of the mound group in 1873 reported 12 mounds in an irregular line, spaced about 40 feet apart along the ridge (Adams 1896).

Twentieth century cultural resources investigations in the Fort Leavenworth military reservation have been limited due to the active nature of the fort. During the 1960s and 1970s a few archaeological sites were recorded, and at least one was partially excavated (14LV328). This burial mound site was on the bluff between Wagner Point and Government Hill. A Hopewell village site recorded in 1970 near the southwestern corner of the reservation was placed on the NRHP in 1973. Two other sites were recorded during the 1973 highway realignment survey conducted in the western portion of the military reservation (Barr and Rowlison 1977). One of these sites contained two burial mounds of an undetermined cultural affiliation and the other is a multicomponent site, containing a prehistoric lithic scatter and an undetermined historic occupation.

In 1977, the U.S. Army Corps of Engineers, Kansas City District directed the Kansas State Historical Society during a cultural resources investigation of 5,000 acres on the military reservation (Barr and Rowlison 1977). This investigation resulted in the recordation of 177 cultural resource sites, of which 157 were identified as historic building sites. Archival and cartographical research assisted in the identification of most of the sites, but the pedestrian survey identified additional sites of which no historic documentation could be found. Only 44 of the historic building sites could physically be identified during the survey. The remaining 113 were recorded as being beneath current facilities such as buildings or parking lots. Many of the Historic Building Sites (HBS) should be considered historic archaeological sites.

In 1988, American Resources Group, Ltd. (ARG) conducted archaeological survey and site evaluation investigations within the Fort Leavenworth military reservation (Wagner *et al.* 1989). Fourteen survey areas within the fort were selected for this investigation, totaling 974 acres. During the survey 34 previously unrecorded sites were documented. The sites were divided between historic sites associated with the occupation of the fort (n=25) and prehistoric occupation of the area (n=9). Fourteen of the sites were recorded as potentially eligible for the NRHP, thirteen of these were recommended for evaluation against the NRHP criteria of significance. The site evaluations conducted by ARG were of two previously recorded sites. The McPherson site (14LV357) was a Kansas City Hopewell village dating to A.D. 200-500, while the Fincher site (14LV358) was a ca. 1840-1880 discard/dump site. Both sites were determined to be eligible for inclusion in the NRHP.

ARG returned to conduct additional cultural resources investigations at Fort Leavenworth in 1992 (Wagner *et al.* 1993). Eight locations were investigated, with seven of these identified as areas of future construction. The areas were investigated by a combination of archival research and screened shovel tests. At six sites the investigation included test unit excavation, while two sites had hydraulic soil probes conducted. Previous archival research (Barr and Rowilson 1977) identified 14 HBS sites within the eight areas. As a result of the investigations one of the HBS sites was identified as being incorrectly recorded. Two areas were identified as not containing cultural resources, while one area was recommended for archaeological monitoring due to the current facilities masking the archaeological deposits. Four other areas were recommended for additional archaeological testing. The eighth area investigated included the evaluation of two areas and delineation of the Fincher site. It was recommended once again that the Fincher site was eligible for inclusion in the NRHP.

Archaeologists from U.S. Army Corps of Engineers conducted several small survey and monitoring projects in the 1990s. Archaeological monitoring was undertaken in 1990 for the excavation of foundations for two structures within the military reservation (Ziegler 1990). In 1992, an archaeological survey was conducted at two proposed parking lot sites within the fort (Ziegler 1992). Also in 1992, archaeological monitoring was conducted during construction of the Eisenhower Hall, which resulted in the identification and excavation of several previously unidentified features (Bailey 1993). Other monitoring work conducted by the U.S. Army Corps of Engineers archaeologists included renovation work at the Beehive, a historic building that was originally constructed in 1882-1883. The archaeological investigation included extensive research in addition to the site monitoring (Ziegler 1995).

In 1995, the University of Kansas conducted site evaluation and later extensive data recovery of the DB site (Logan 1998). This site contained multiple prehistoric components, with the researchers concluding that people during the Paleo-Indian, Middle Archaic, Late Archaic, Middle Woodland, and Late Prehistoric periods (Logan 1998) had occupied the site.

The most recent archaeological investigations at the fort included the 2000 site evaluations of two archaeological sites (14LV114 and 14LV118) (Fox *et al.* 2000) that were recorded during the 1988 survey (Wagner *et al.* 1989). It was determined that the historic dumpsite (14LV114) is eligible for inclusion in the NRHP, but the prehistoric activity area (14LV118) was only classified as potentially eligible pending further research (Fox *et al.* 2000).

Even though there have been several surveys in the boundaries of Fort Leavenworth and surrounding areas, none of the surveys have extended into the current project area. Sallani (1987) conducted an archaeological survey in a similar setting in the southeast corner of the fort and another area just south of fort boundaries in. No cultural resources were identified in the fort, but one site was found in the area along the east boundary of the City of Leavenworth. Sallani's project domains were much larger than the current project, but were apparently confined to a visual inspection of the modern ground surface.

## **6.0 GEOMORPHOLOGICAL INVESTIGATION**

## **6.0 GEOMORPHOLOGICAL INVESTIGATION**

### **6.1 INTRODUCTION**

This section of the report contains the results of the geomorphological investigation that was conducted in support of the Phase I cultural resource survey of the project area. The primary objective of this investigation was to determine the geologic potential for buried archaeological deposits in the project area. This information was used to determine whether traditional archaeological survey methods were adequate, and whether deeper subsurface testing was needed.

### **6.2 GEOMORPHOLOGY AND GEOLOGY OF THE PROJECT AREA**

The project area is located in Fenneman's (1931) Glaciated Central Lowlands region of the Great Plains physiographic province. During the Pre-Illinois Episode of the Pleistocene, the area was covered by continental ice sheets that extended as far south as the Kansas River in northeastern Kansas. Glaciers buried pre-glacial stream valleys, cut new valley segments, and leveled cuesta-form uplands. Pro- and post-glacial streams subsequently dissected the drift plain, leaving glacial deposits high in the landscape. Hence, this region is often referred to as the Dissected Till Plains (Schoewe 1949).

Along the bluffs of the Missouri River at Ft. Leavenworth, Pennsylvanian-age limestone and shale of the Kansas City Group are mantled by Pre-Illinoian glacial till and/or thick deposits of late Pleistocene loess. At least three stratigraphically superposed loesses are present in the area: the Loveland, Gilman Canyon, and Peoria. The Loveland loess is the most widespread pre-Wisconsinan loess in the Midcontinent. It is typically yellowish-brown or reddish-brown eolian silt that reddens (as a result of weathering) toward the top of the unit. Regional stratigraphic relationships suggest that the Loveland loess in northeastern Kansas is Illinoian in age, and that the Sangamon Soil developed in the upper part of the unit is buried by Wisconsinan deposits. Thermoluminescence (TL) dating at the Loveland paratype section in western Iowa indicates that the Loveland loess was deposited from 135 to 140 ka B.P. (Forman et al. 1992; Maat and Johnson 1996).

The upper part of the Loveland loess is weathered to the Sangamon Geosol (Mandel and Bettis, 2001). This pedostratigraphic unit is usually well expressed and its color ranges from a vivid to pale reddish-brown. Constraining TL and radiocarbon ages indicate that the period of pedogenesis could have extended from about 120 to 55 ka (see Mandel and Bettis 1995, 2001).

The Gilman Canyon Formation was first described in south-central Nebraska (Reed and Dreeszen 1965). This is the earliest Wisconsinan loess and is in the stratigraphic position of the Pisgah Formation in western Iowa (Bettis 1990) and the Roxana silt of the upper Mississippi River basin (Follmer 1983; Leigh and Knox 1993). The Gilman Canyon Formation is a dark, noncalcareous silt loam that has been modified by pedogenesis. Radiocarbon and TL ages from the Gilman Canyon Formation range from about 40,000 at its base to 24,000 yr B.P. at the top (see Mandel and Bettis 1995, 2001).

Peoria loess, the dominant surficial deposit on uplands in the project area, overlies the Gilman Canyon Formation or Sangamon Soil, and is typically a calcareous, massive, light yellowish tan to buff colored silt loam. In Leavenworth County, the Peoria loess is as much as 9-10 m along the bluff line of the Missouri River valley, but rapidly thins to the west. Radiocarbon ages from the Peoria loess in the Eastern Plains range from about 24,000-23,000 yr B.P. at its base to 13,000 yr B.P. near the top (Martin 1993; Johnson et al. 1993; May and Holen 1993; Mandel and Bettis 1995, 2001).

The project area is located on a relatively flat bench that stands about 9 m above the valley floor of the Missouri River (Figure 6-1 and 6-2). A steep scarp separates the surface of the bench from the valley floor. Before our investigation was completed, we thought this bench might represent a high alluvial terrace of the Missouri River. However, as explained below, the bench is an artificial feature that is a product of landscape modification that accompanied development of Fort Leavenworth.

### **6.3 METHODS**

Prior to the mid-1980s, most archaeologists working in Kansas and other areas of the Great Plains relied on traditional methods of surface surveys to locate prehistoric cultural deposits (Mandel 2000). These methods, such as pedestrian surveys and shallow shovel testing, rarely detect buried cultural materials. Bettis and Litke (1987:3) pointed out that inadequate subsurface sampling in river valleys has led to significant gaps in the record of known prehistoric cultural resources, as well as erroneous conclusions about some aspects of regional cultural history. A number of studies (e.g, Artz 1985; Johnson and Martin 1987; Mandel et al. 1991; Mandel 1992, 1994a, 1994b, 1995, 1996) have demonstrated that river valleys have extensive surfaces that are geologically quite young, often post-dating 2000 B.P., and that most of the existing record of prehistoric cultures is deeply buried.

The field investigation initially involved reconnaissance of the project area to select localities for subsurface exploration. Trenching was prohibited within 50 feet of a railroad track on the east side of the project area, and the presence of underground utilities was a limiting factor in selecting trench localities.

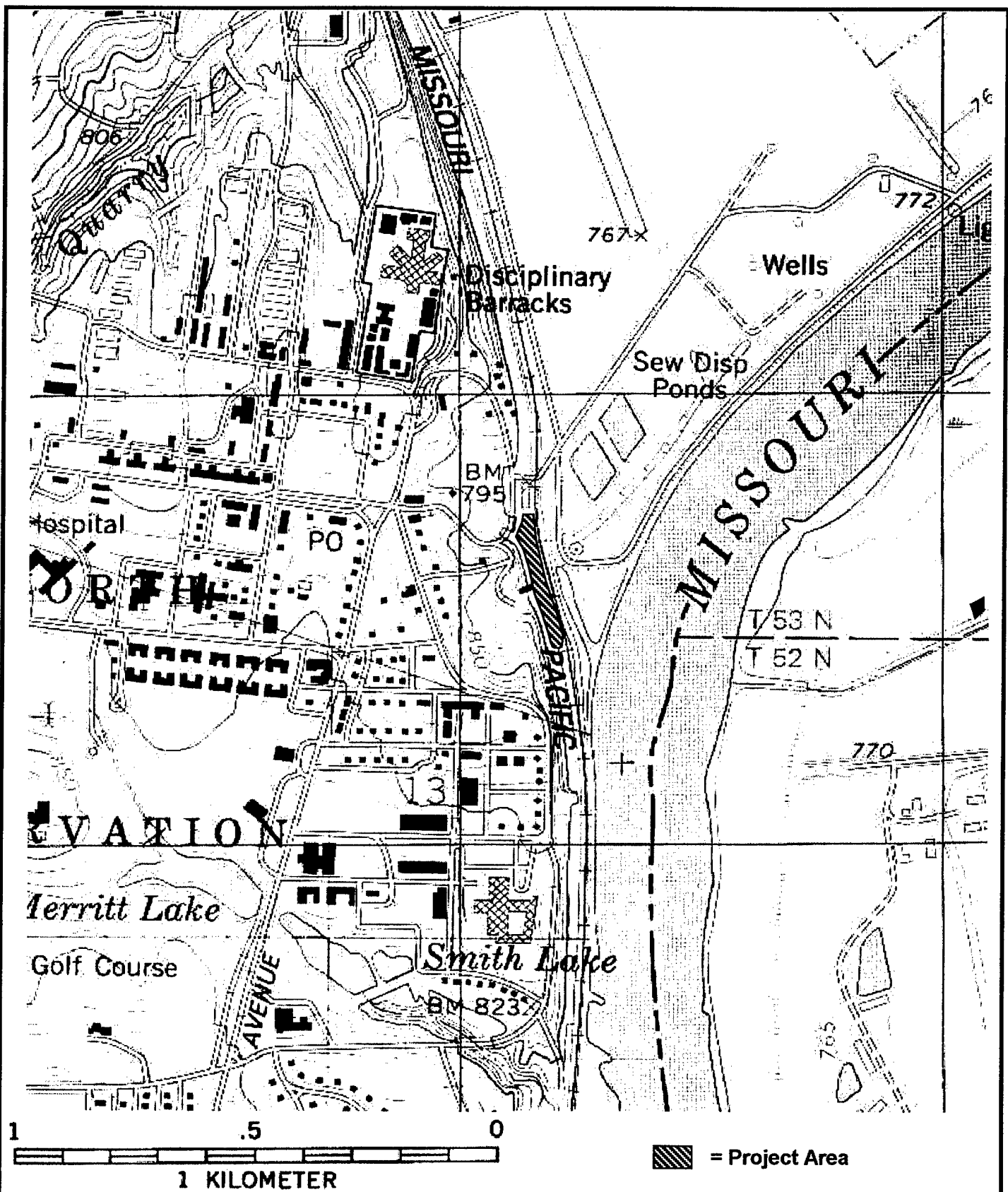
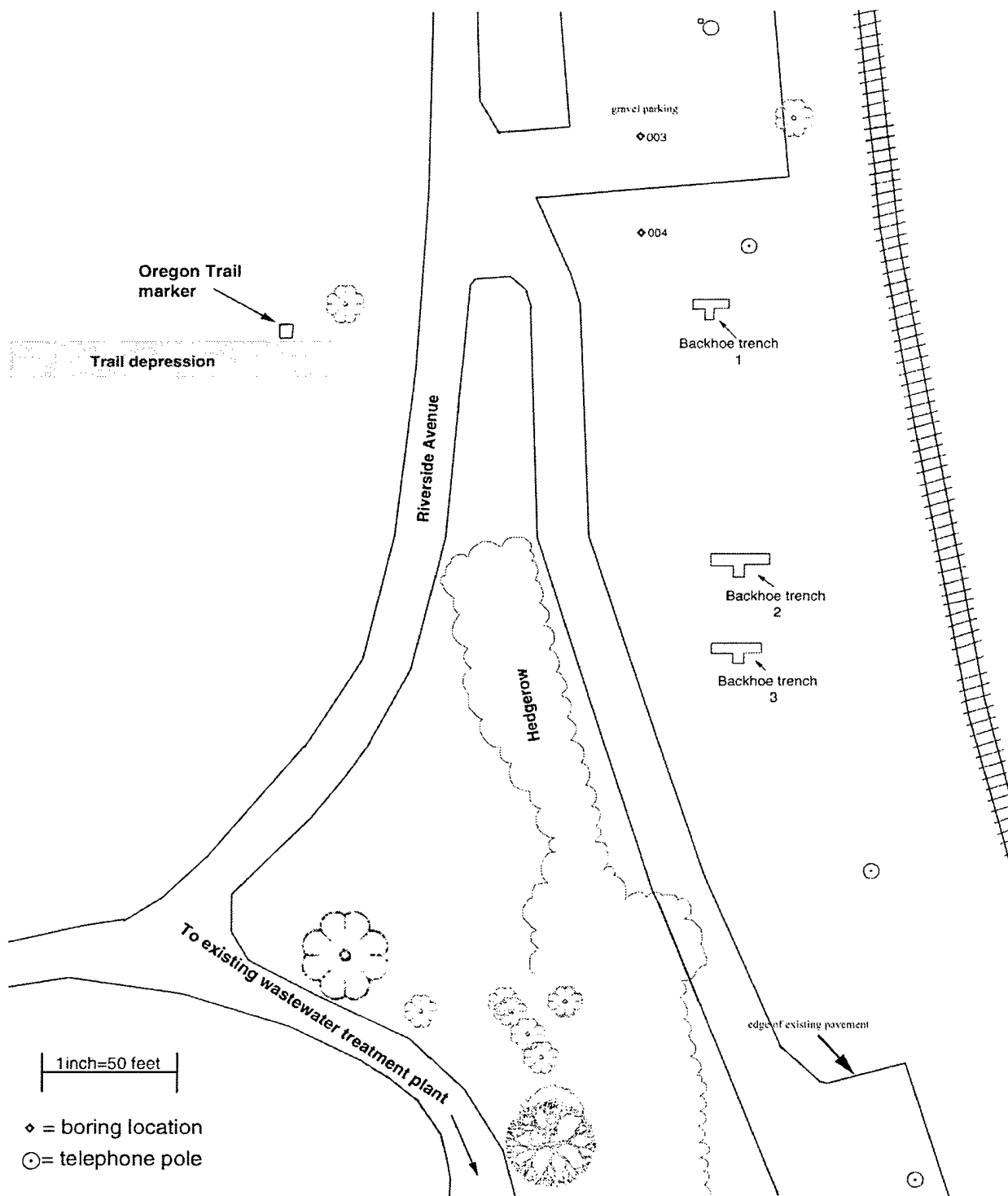


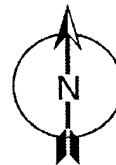
Figure 6-1

Enlarged Detail of Leavenworth, Kans.-Mo. Quad Map





**Figure 6-2**  
Project area.



Next, a rubber-tire backhoe with a 24-inch-wide bucket was used to excavate three T-shaped trenches along a north-south transect in the project area (Figure 6-2 and 6-3). One of these trenches (Trench 3) was excavated in the area of the proposed gravity thickener. The trenches were approximately 5 m long and 1.5 - 2.5 m deep. Trench walls were cleaned with a hand shovel and trowel and described. Sediments and soils were described using standard procedures and terminology outlined by Soil Survey Staff (1996) and Birkeland (1999). Graphic sediment-soil logs were constructed to visually convey stratigraphic and soil information.

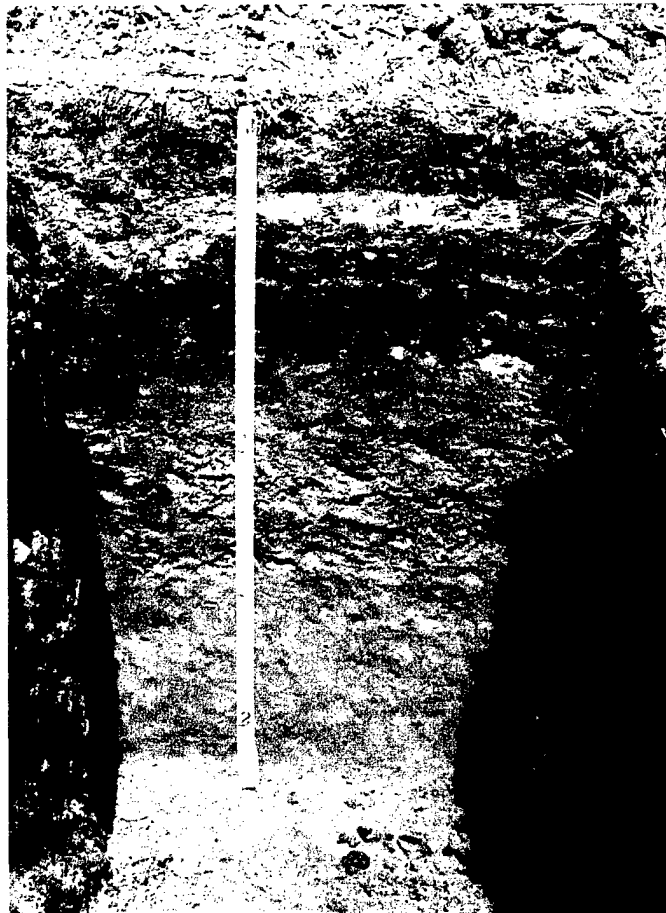
## 6.4 RESULTS

Trench 1 at the northern end of the project area exposed a 140-cm-thick package of Historic landfill overlying Peoria loess (Figure 6-4 and 6-5). The landfill is stratified and consists of a variety of material, including brick and rock fragments, pebbles, clinker, ash, and fine-grained sediment (Table 6-1). The fill rests on a relatively level surface cut into silty sediment resembling the late Wisconsinan Peoria loess. Based on the exposure in Trench 1, the modern soil developed in the silty sediment along the slopes of the valley wall was mechanically removed prior to emplacement of the artificial fill; only a C horizon was observed beneath the landfill.

**Table 6-1. Description of Trench 1.**

Depth (cm)	Soil Horizon	Description
0-22	---	<b>Landfill.</b> Dark brown (10YR 4/3) silt loam, dark brown (10YR 3/3) moist; weak coarse platy structure parting to weak fine granular; friable; gradual smooth boundary.
22-35	---	<b>Landfill.</b> Brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; weak coarse platy structure parting to weak fine granular; friable; common pebbles; abrupt wavy boundary.
35-70	---	<b>Landfill.</b> Very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; massive; friable; matrix is largely composed of fine clinker; many inclusions of rock, brick fragments, pebbles, and ash; abrupt irregular boundary.
70-140	---	<b>Landfill.</b> Mixed matrix of yellowish brown (10YR 5/4) and olive brown (2.5YR 4/3 and 4/4) silt loam and silty clay loam; massive; friable; few inclusions of olive yellow (2.5Y 6/8) silt loam; many rock fragments; common fine pebbles; few pieces of clinker 0.5-2.0 cm in diameter; abrupt wavy boundary.
140-220+	C	<b>Peoria Loess.</b> Yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 4/4) moist; massive; friable; common fine pores.

Trench 2 exposed a 170-cm-thick package of stratified landfill (Figure 6-6 and 6-5). Most of the fill material is a mixed matrix of shale fragments and shale-derived soil (Table 2). The fill overlies a deeply-truncated soil; only the BC horizon of a loess-derived soil is present. Hence, like the area of Trench 1,



**Figure 6-3**

View of project area, including the 3 backhoe trenches excavated for the geomorphological investigation. View to Southwest.

**Figure 6-4**

View of the north wall of Trench 1.



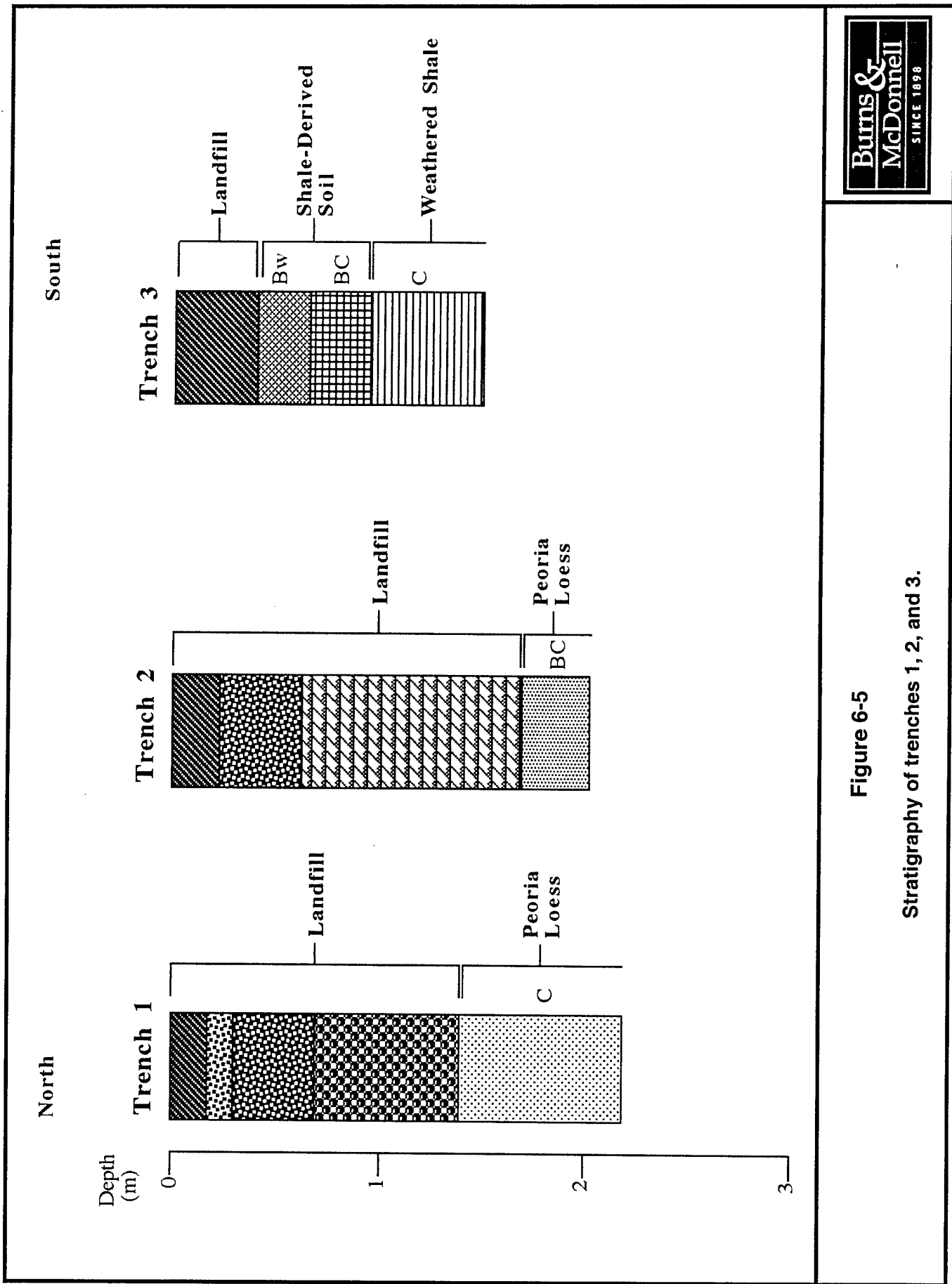
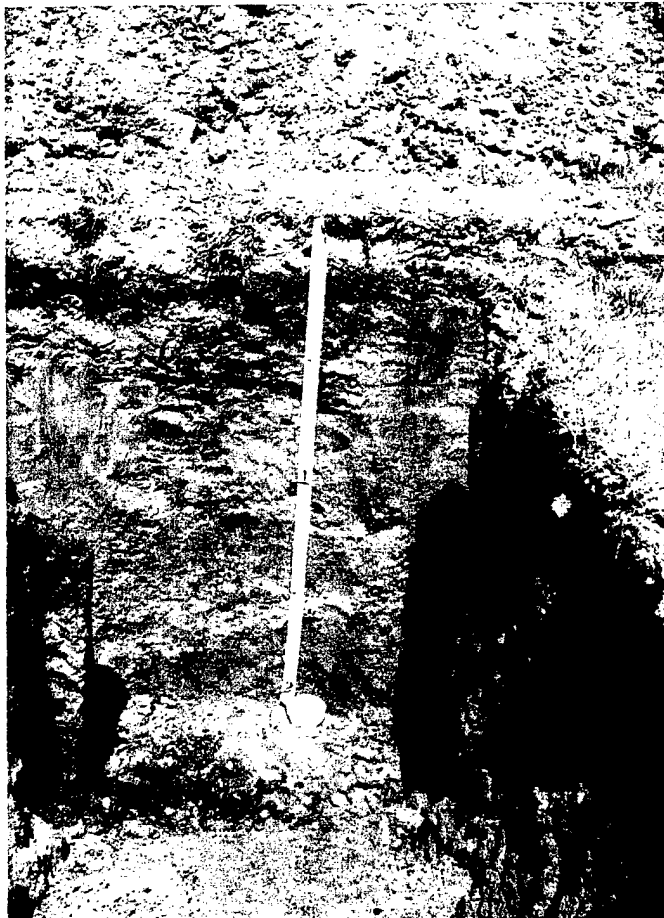


Figure 6-5  
Stratigraphy of trenches 1, 2, and 3.



**Figure 6-6**

**View of the north wall of Trench 2.**



the area of Trench 2 was mechanically stripped before the landfill material was deposited on the leveled surface.

**Table 6-2. Description of Trench 2.**

Depth (cm)	Soil Horizon	Description
0-25	---	<b>Landfill.</b> Light olive brown (2.5Y 5/3) heavy silty clay loam to silty clay, olive brown (2.5Y 4/3) moist; weak coarse platy structure parting to weak fine platy; friable; common shale fragments; abrupt smooth boundary.
22-60	---	<b>Landfill.</b> Very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; weak coarse platy structure parting to weak fine platy; friable; common brick and rock; common clinker and ash; few shale fragments; abrupt wavy boundary.
60-170	---	<b>Landfill.</b> Light yellowish brown (10YR 6/4) silt loam to silty clay loam, yellowish brown (10YR 5/4) moist; massive; friable; many inclusions of weathered olive yellow (2.5Y 6/6-6/8) shale fragments; few inclusions of dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; few small fragments of brick and limestone; abrupt irregular boundary.
170-200	BC	Brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) light silty clay loam; very weak fine subangular blocky structure parting to very weak very fine subangular blocky; friable.

Trench 3 was excavated in the area of the proposed gravity thickener. This trench exposed a 40-cm-thick veneer of landfill above a residual soil developed in Pennsylvanian-age shale (Figure 6-7 and 6-5). The soil has a Bw-BC-C profile (Table 3); the A horizon was stripped off before the fill was emplaced on the truncated Bw horizon. Weathered bedrock (C horizon) was intercepted at a depth of only 95 cm below the modern land surface. Hence, there is an outcrop of shale in the valley wall in the immediate area of the proposed gravity thickener.

**Table 6-3. Description of Trench 3.**

Depth (cm)	Soil Horizon	Description
0-40	---	<b>Landfill.</b> Dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak coarse platy structure parting to weak fine granular; friable; many rounded pebbles and cobbles; abrupt smooth boundary.
40-60	Bw	Light yellowish brown (2.5Y 6/4) silty clay, light olive brown (2.5Y 5/4) moist; common fine distinct light olive brown (2.5Y 5/6) mottles; moderate medium subangular to angular blocky structure; very firm, very hard; common ferromanganese stains on ped faces; common shale fragments; gradual smooth boundary.
65-95	BC	Light yellowish brown (2.5Y 6/4) silty clay, light olive brown (2.5Y 5/4) moist; many fine prominent olive yellow (2.5Y 6/8) mottles; weak coarse angular blocky structure parting to weak fine and medium angular blocky; very firm, very hard; faint bedding; common ferromanganese stains on ped faces; common shale fragments; gradual smooth boundary.
95-150	C	Light yellowish brown (2.5Y 6/4) silty clay weathered shale grading downward to shale, light olive brown (2.5Y 5/4) moist; massive with prominent bedding; very firm, very hard; many shale fragments.

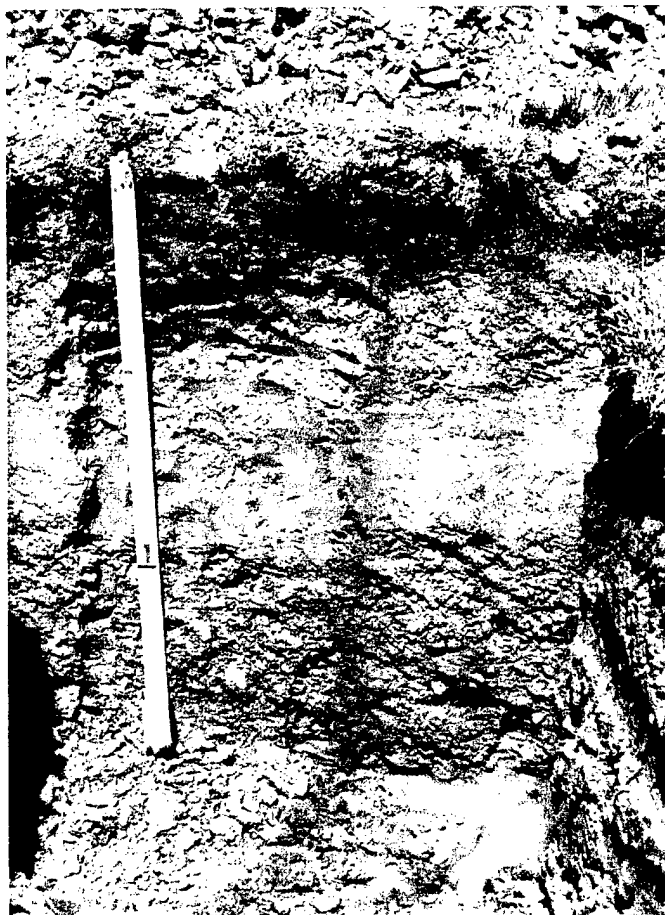


Figure 6-7

View of the north wall of Trench 3.



## 6.5 CONCLUSIONS

Based on the results of the subsurface exploration, there is low geologic potential for buried historic and prehistoric cultural resources in the project area. Trenches 1 and 2 revealed a thick mantle of landfill above silty sediment typical of the Peoria loess. As noted earlier, sediment composing the Peoria loess accumulated between ca. 24,000 and 13,000 yr B.P. Given the age of the Peoria Formation, only Pre-Clovis archaeological materials can occur *in situ* in the loess, and the potential for such ancient cultural deposits is extremely low. Although it is likely that some of the loess was redeposited as slopewash during the Holocene, it is important to note that (1) there are no buried soils in the package of silty sediment beneath the landfill, and (2) most or all of the surface soil was mechanically stripped off before the landfill was emplaced on the landscape.

Although the mantle of landfill thins towards the southern end of the project area, the silty sediment beneath the fill is replaced by bedrock. In the area of the gravity thickener, a truncated shale-derived soil underlies a thin veneer of landfill, and weathered Pennsylvanian-age bedrock is less than 1 m beneath the land surface. There is no geologic potential for *in situ* buried cultural resources in what remains of the shale-derived soil.

In sum, the project area has been drastically disturbed by landscape modification associated with development of Fort Leavenworth. The relatively flat bench that is the site for the proposed water treatment facility is artificial. The slope of the valley has been mechanically leveled and covered with landfill. Hence, cultural resources that may have been associated with the formerly undisturbed landscape were undoubtedly stripped off during the land-leveling process. Quaternary deposits that underlie the landfill in the northern half of the project area have low geologic potential for containing buried cultural resources because of the great antiquity of the sediments that compose these deposits (24,000-13,000 yr B.P.). In the southern half of the project area, a thin veneer of landfill overlies a residual soil developed in shale; there is no potential for buried cultural resources in the shale-derived soil. Based on these findings, subsurface archaeological testing is not recommended for the project area.

## **7.0 SUMMARY AND RECOMMENDATIONS**

## **7.0 SUMMARY AND RECOMMENDATIONS**

This chapter provides an evaluation of the research conducted, the research questions presented in Chapter 5, and the recommendations of the investigators.

### **7.1 ARCHIVAL RESEARCH**

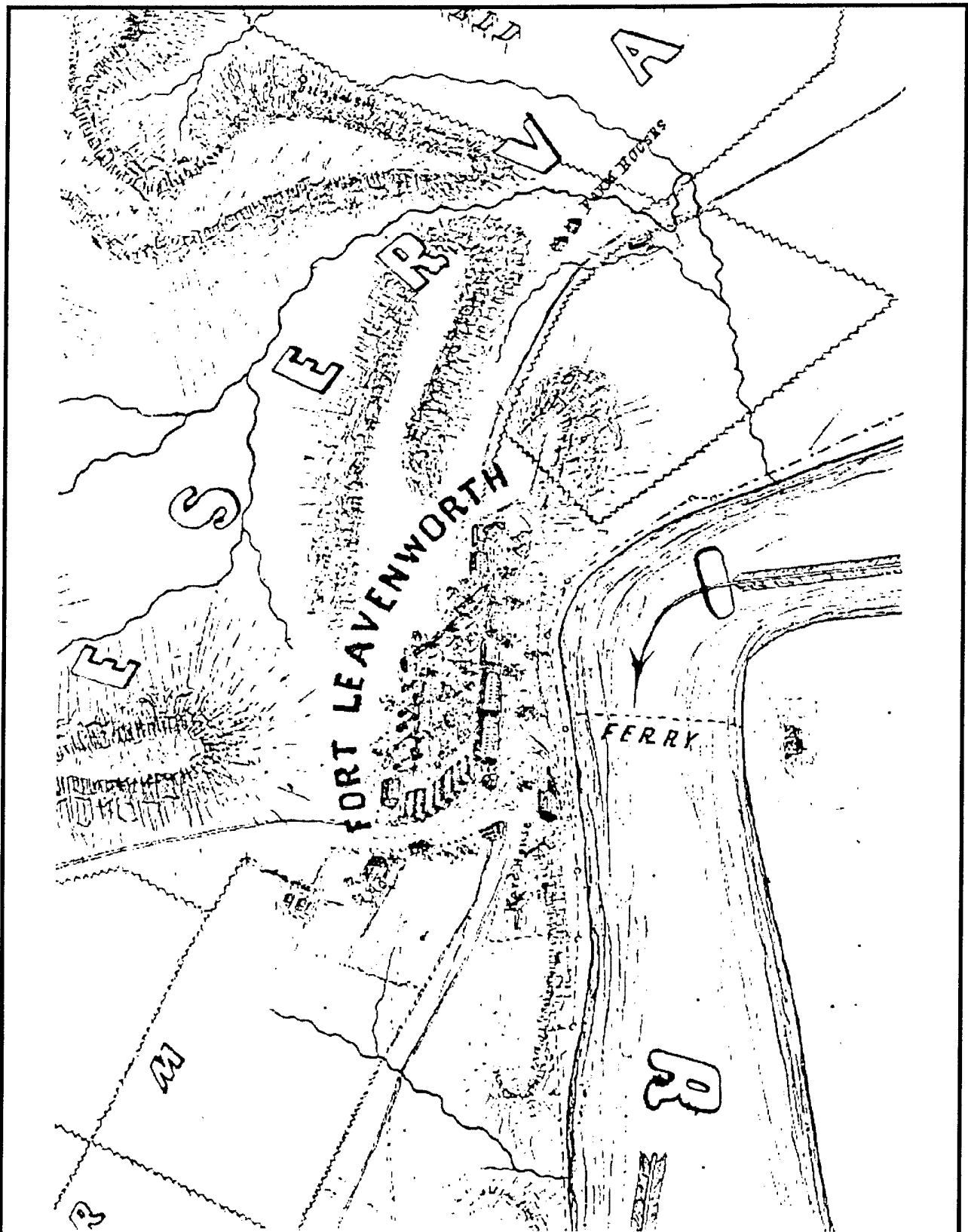
Burns & McDonnell archaeologists conducted archival research at the Frontier Army Museum, Fort Leavenworth and the Kansas State Historical Society, Topeka. It was determined that the majority of the information related to historic structures within the Fort Leavenworth military reservation was available in the variety of historic maps of the fort, as indicated by some of the previous cultural resource (Barr and Rowlinson 1977; Wagner et al. 1989). These maps were constructed periodically during the history of the fort, but the scales (if present) were varied. It was initially considered to present these maps overlaying the project area map, but it was determined that the scales and reference points were too varied to make an accurate representations and therefore the maps are presented individually (Figures 7-1 through 7-7).

The historic maps indicate that the main construction and activity areas of the fort were on the bluff to the west of the project area (Figure 7-1 and 7-2). Two buildings related to shipping and storage were plotted in the vicinity of the project area (Figures 7-2 and 7-7) from 1855 to at least 1885. No evidence of either structure was observed on the surface or during the backhoe/geomorphic testing of the project area.

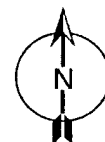
The shoreline of the Missouri River, near the eastern border of the project area, included a historic boat landing (Figure 7-8). The main structure in the Figure 7-8 is on the slope and little remains of the structure today, as it has been reduced to the block foundation and is overgrown (Figure 7-9). The proposed project will have no direct impact on the foundation.

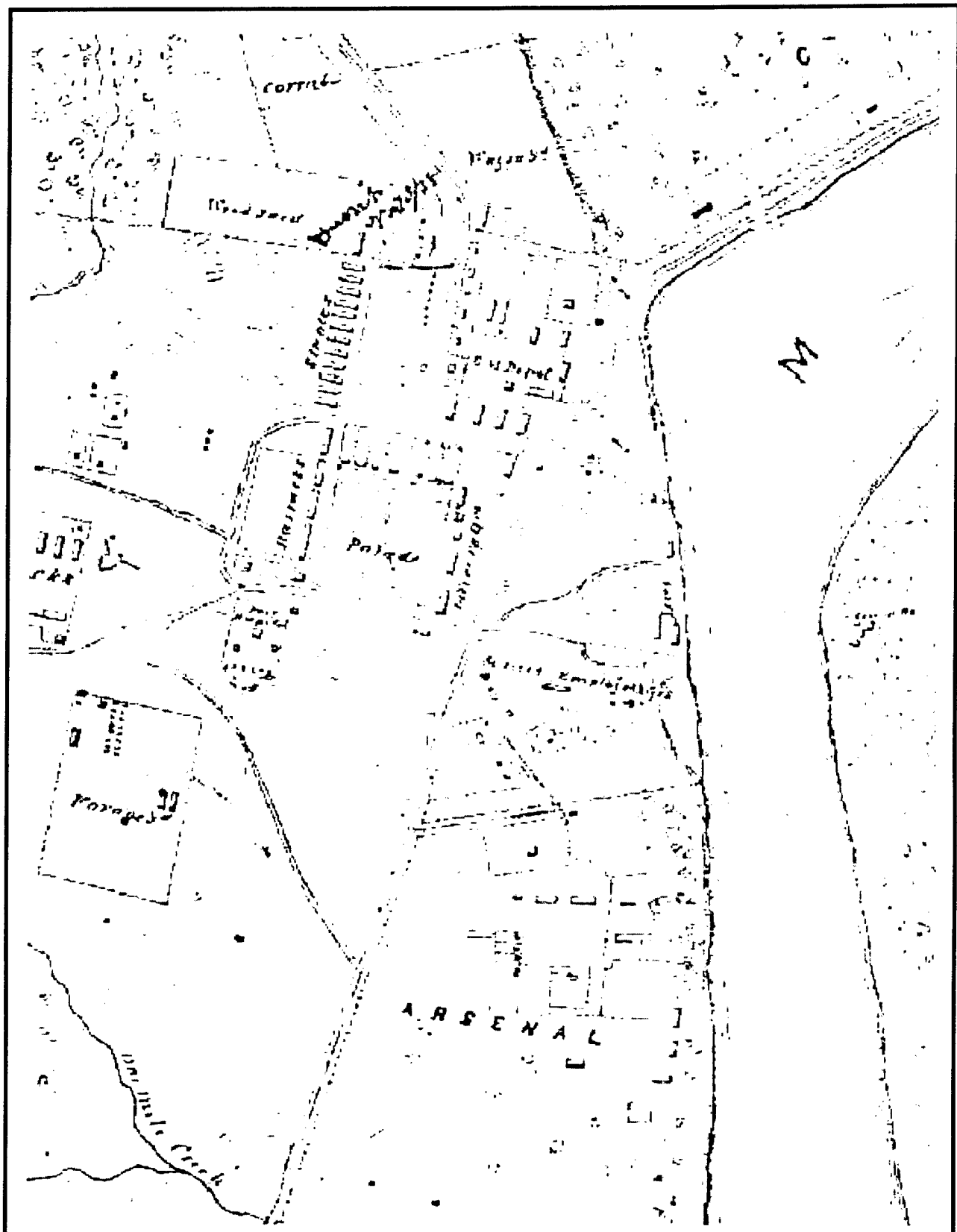
### **7.2 ENGINEERING BORING**

On July 10 - 11, 2000, two deep cores were collected within the current boundaries of the APE in order to determine the nature of the soils and sediments and their suitability for the construction of the wastewater treatment plant. These two borings revealed the presence of overburden to a depth of 15.5 and 16.4 feet below surface before reaching bedrock. The boring records do not indicate the presence of cultural materials. However, the nature and color of the fill changed from

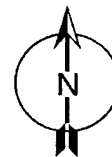


**Figure 7-1**  
 Fort Leavenworth Military Reservation  
 showing general project area  
 (Adapted from F.E. Hunt, 1854)



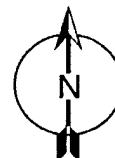


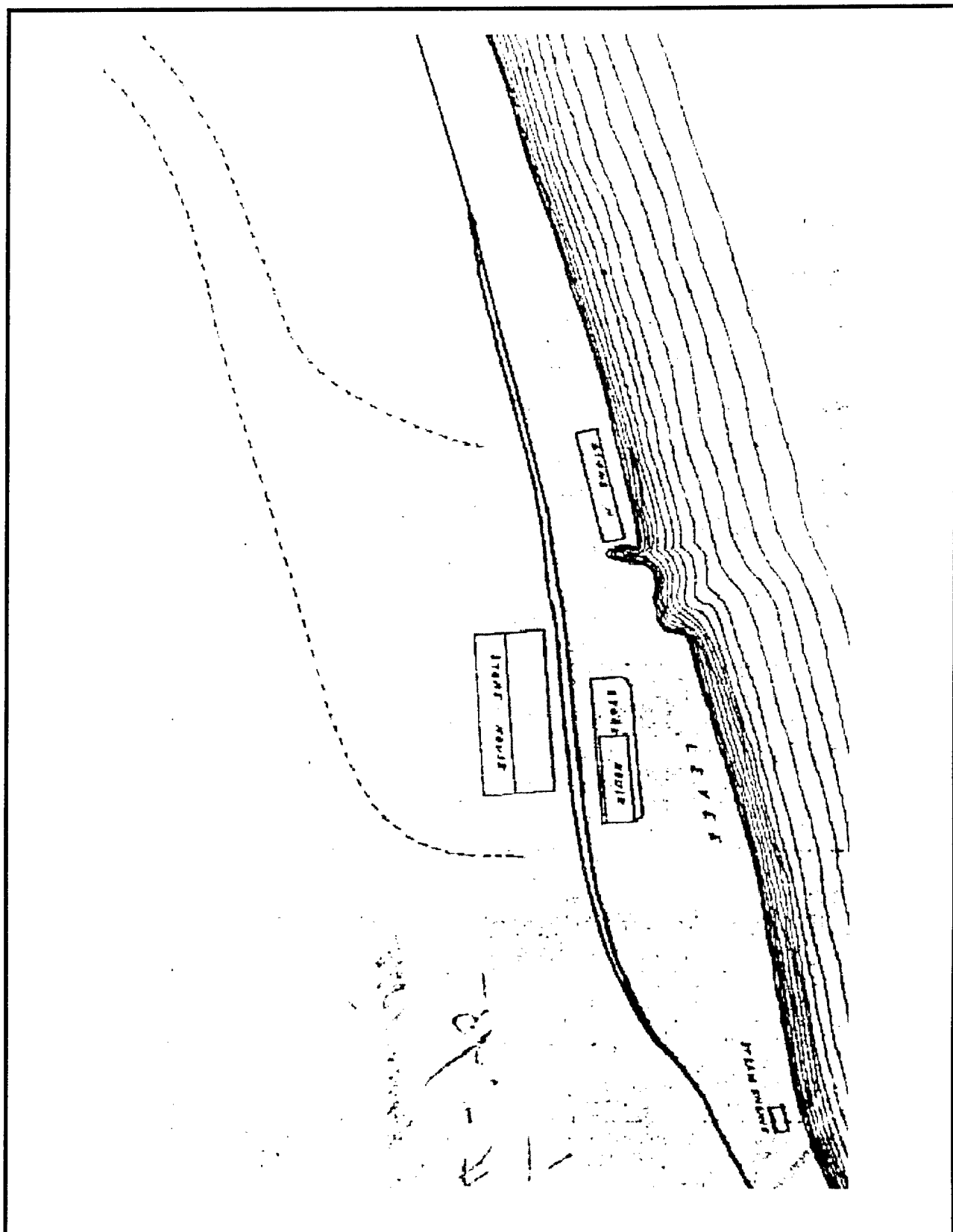
**Figure 7-2**  
 Fort Leavenworth Military Reservation  
 showing general project area  
 (Adapted from Col. J.A. Potter, Undated)





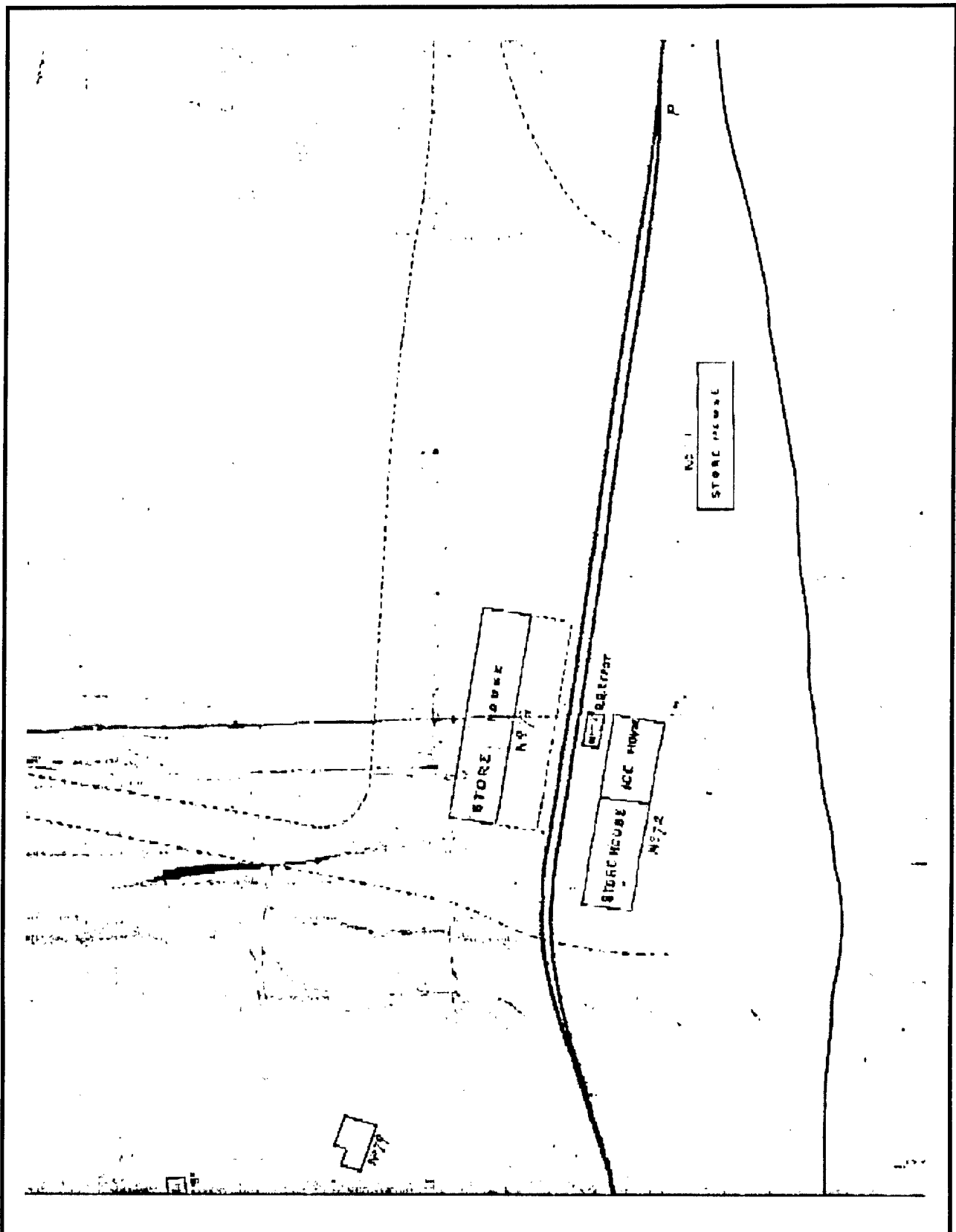
**Figure 7-3**  
 Fort Leavenworth Military Reservation  
 showing general project area  
 (Author unknown, 1855)



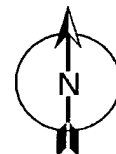


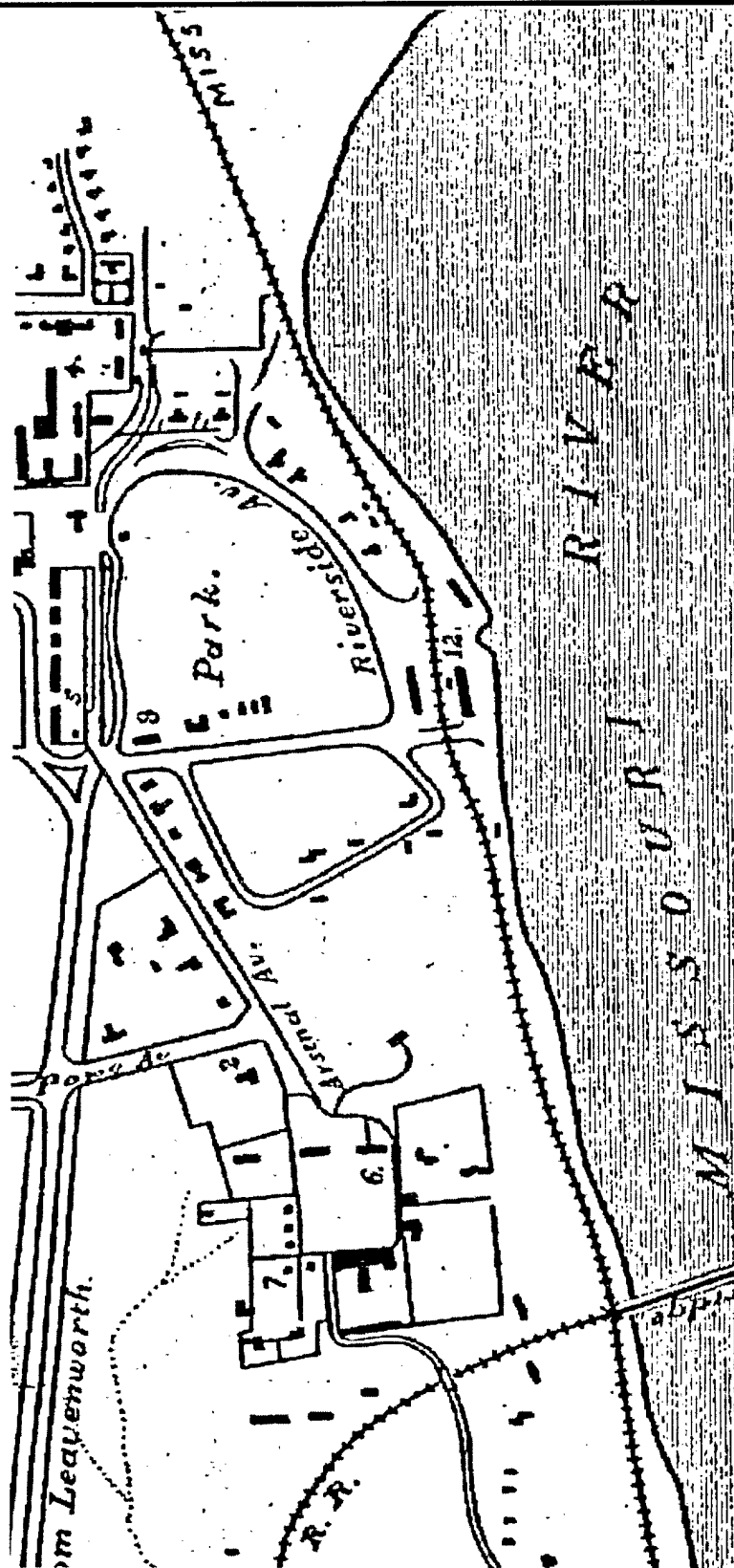
**Figure 7-4**  
 Fort Leavenworth Military Reservation  
 showing general project area  
 (Adapted from 1st Lieut. E.H. Ruffner, 1871)



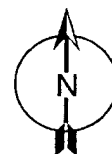


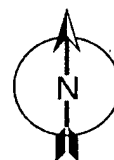
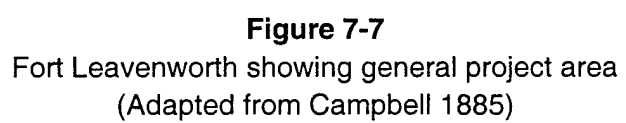
**Figure 7-5**  
Fort Leavenworth Military Reservation  
showing general project area  
(Adapted from Col. Tombkins, 1881)





**Figure 7-6**  
 Fort Leavenworth Military Reservation  
 showing general project area  
 (Adapted from W. Kilp, 1884)







**Figure 7-8**  
Old Boat Landing from railroad bridge, view to Northwest  
(1880's-1903)  
(On file at Frontier Army Museum, Fort Leavenworth)





**Figure 7-9**

Block foundation. View to South-Southwest



a compacted brown to dark brown sandy or silty clay to a soft and moist light brown silty clay at varying depths.

### **7.3 FIELD METHODS**

Field work for Burns & McDonnell cultural resources personnel and its subcontractors conducted the current geomorphological investigations on April 9, 1901. Rolfe Mandel, geomorphologist, and Eric Petersen, archeologist undertook the work. Larry Bair Excavating, Inc conducted backhoe operations. After locating the boundaries of the proposed project area (Figure 6-2), we discovered that the area available for investigation was limited on the eastern boundary by the Missouri Pacific Railroad right-of-way, a fiber optic cable line and power cable of unknown purpose. Because of the safety and right-of-way restrictions posed by each of the three intrusions, the remaining area accessible for trenching was limited to an area approximately 60 by 200 feet.

Based on this surface examination, Backhoe Trench 1 was located at the northern end of the project area but south of the existing parking lot (Figure 6-2 ). Two additional backhoe trenches were laid out and examined for both geomorphological stratigraphy and cultural materials. The original scope of work under which the fieldwork was conducted required six to eight backhoe trenches to be excavated, and deep coring was proposed at the location of the gravity thickener.

Geomorphic investigations involved use of a backhoe using a two-foot, toothed bucket. Three trenches were excavated each in a "T" configuration. After trenches were dug, the trench wall exposed at the intersection of the "T" was hand scraped using a shove and trowel and examined for both geologic stratigraphy and cultural deposits.

After excavation of the three "T" trenches and on-site discussions with Robert Ziegler, Ph.D., US Army Corps of Engineers archeologist for the Kansas City District, it was agreed that because of the right-of-way intrusions mentioned above, the three backhoe trenches were sufficient to examine the stratigraphy and to test for cultural deposits. A Giddings hydraulic soil probe was brought to the project area to examine specific areas of the APE in which particularly deep disturbance was proposed. However, because the trenches excavated during the geomorphological investigation indicated that such probes would not encounter any deep cultural manifestations, no coring was undertaken.

## **7.4 CONCLUSIONS**

The field investigations indicate that it is unlikely that intact cultural resources are present within the project Area of Potential Effect. The lack of any sites in the APE eliminated any in-depth discussion of the research questions proposed in Chapter 4.

1. Determination of the presence of subsurface deposits and the horizontal and vertical extent of those deposits.

Based on the results of the geomorphological investigation, it is unlikely that subsurface cultural resources are present in the project area.

2. Assessment of site integrity and the severity of impacts to the deposits.

No archaeological sites were identified within the project APE and it is not likely that the proposed project will adversely impact any cultural resources.

3. Definition of site function and assessment of site type.

No cultural resources were identified during the current investigation and it is unlikely any exist beneath the modern landfill.

## **7.5 RECOMMENDATIONS**

It is the opinion of the investigators that the proposed project will not impact any significant cultural resources and the project should be allowed to proceed as planned.

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